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SCREENING OF ALTERNATIVES TO ABATE PCB CONTAMINATION IN WAUKEGAN HARBOR
and
ENVIRONMENTAL ASSESSMENT OF LAGOON CONSTRUCTION

Submitted to:

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1.0. INTRODUCTION

In 1975, high levels of polychlorinated biphenyls (PCB) were detected in the soil and harbor sediments of Waukegan Harbor and adjacent areas. There are three distinct areas of PCB contamination; in the sediments and water of Waukegan Harbor, in a surface drainage system on the north side of the Outboard Marine Corporation (OMC) property, and in the sub-strata of a parking lot adjacent to the drainage ditch (Figure 1). The presence of large quantities of PCBs in these areas represents an immediate and long term threat to Lake Michigan water quality, fish populations, and public health. The US Environmental Protection Agency (USEPA) is pursuing a solution to this situation in two ways:

- Seeking, through litigation, to require that OMC pay for clean up of the site

- Identifying and developing solutions to the contamination problem before the issue of responsibility is resolved.

Alternative conceptual methods for abating PCB contamination in the three areas have been screened. At the present time (August 1981), engineering plans and specifications are being prepared to determine the most practical and effective method of abatement of PCB contamination in each area. This report identifies the conceptual alternatives and evaluates their feasibility for use in the abatement of PCB contamination in the Harbor. Based on this screening of conceptual alternatives, the dredging and offsite disposal of PCB contaminated Harbor sediments is presented as the recommended abatement alternative. There are several optional methods for removal and disposition of contaminated Harbor sediments. These options have also been screened, and design and planning work has begun on the options that are considered to be technically and environmentally sound. Cost has been a factor in the screening and design of options, but not a limiting consideration.

The dredging and offsite disposal of PCB contaminated Harbor sediments, regardless of the technique employed, will require the use of a dewatering

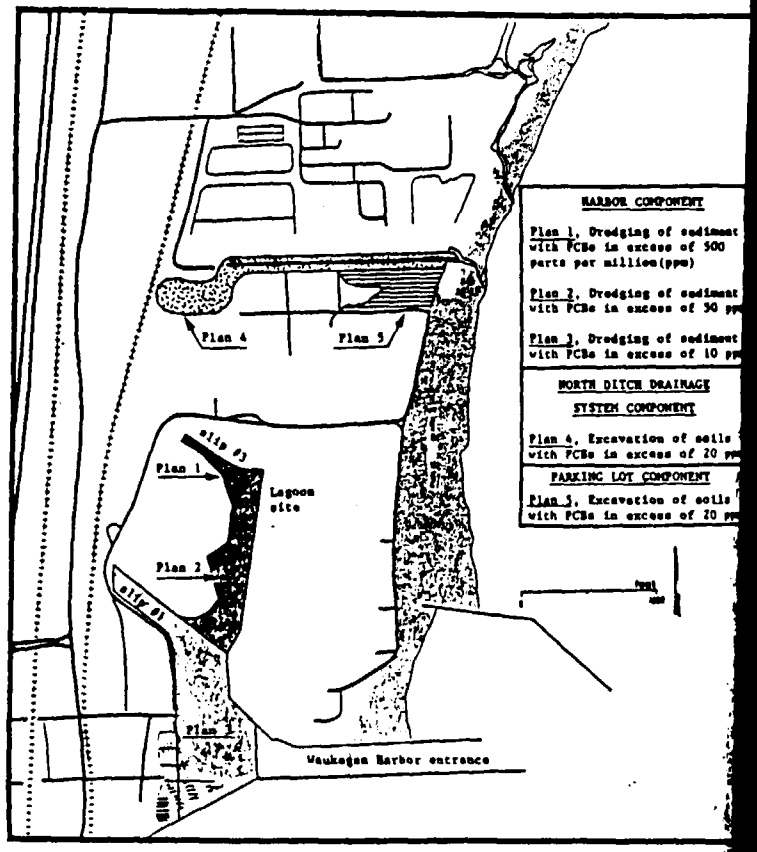

Figure 1. Map of the project area showing removal components for PCB contaminated materials. Map features are derived from color aerial photography by the U.S. Environmental Protection Agency: May 1978. Plan 1 through 5, for dredging and excavation of PCB contaminated materials, are derived from plans and specifications provided to USEPA by Mason and Hanger Engineers (1981).

lagoon to improve the handling properties of contaminated sediments and to take PCBs out of water extracted from those sediments. The immediate threat to human health posed by PCB contamination of Harbor sediments requires that feasible cleanup solutions be implemented as quickly as possible. Under the present schedule, Harbor dredging could begin as early as September 1982. Harbor dredging cannot begin, though, until a dewatering lagoon is in place and ready to operate. The construction of a dewatering lagoon will take approximately 18 weeks. Because further delay is considered unacceptable, USEPA has determined that segmenting the overall project in terms of National Environmental Policy Act (NEPA) compliance is an acceptable course of action.

The impacts associated with lagoon construction appear to be minimal. Therefore, USEPA has decided to prepare an Environmental Assessment (EA) on lagoon construction and an Environmental Impact Statement (EIS) on the remaining project components. If the assessment of potential impacts associated with lagoon construction were included in the overall EIS process, construction of the dewatering lagoon, and consequently, dredging of Harbor sediments, would be delayed by one full construction season. In addition to identifying and screening abatement alternatives, this report assesses the environmental consequences of lagoon construction to determine if that step can be taken without significant, adverse environmental impacts. Although segmented in terms of NEPA compliance, USEPA will consider and will respond to all reasonable comments on proposed actions throughout the EA and EIS process.

2.0. DESCRIPTION AND SCREENING OF ALTERNATIVES

2.1. Description of Potentially Feasible Methods to Abate the PCB Contamination

In 1975 PCB contamination was found in Waukegan Harbor and in an adjacent area referred to as the North Ditch. In 1979, a new area of contamination was discovered in the soils of the OMC parking lot south of the east-west section of the North Ditch. These areas are shown on Figure 1, a map of the project area. Field studies that measured the extent of PCB contamination in and around Waukegan required several years to complete and it was not until 1980 that the full extent of contamination was revealed (USEPA 1981). Since that time numerous conceptual designs or plans have been discussed as potential components of an abatement plan for all PCB contamination. Initial screening then took place to determine which conceptual plans would be receiving detailed engineering work. The screening of alternatives pertaining to the contamination in the North Ditch and parking lot will be presented in the complete project EIS. This EA addresses the components of the project relating to abatement of PCB contamination in the Harbor area.

For the purposes of screening abatement alternatives, the concept of feasibility was used in the broadest sense. The objective was to select a feasible alternative from which a detailed abatement project could be developed. Because of continued PCB movement into Lake Michigan and associated public health concerns, time could not be wasted on concepts that were environmentally, socially or technically unacceptable. All components of the project were reviewed with this in mind. The potentially feasible alternatives that were reviewed are discussed in the following sections (USEPA 1981).

2.1.1. Removal of Contaminated Harbor Sediments

Excavation of Harbor sediments

In this concept a dam would be built across the Harbor entrance and water behind the dam pumped through a water treatment system and back into Lake Michigan. Exposed Harbor sediments would then be excavated and transported to a final disposal site. The dam would then be removed and the Harbor returned to normal use.

Dredging of Harbor sediments

Dredging is a technique that could be used to remove sediments from portions of Waukegan Harbor without precluding all existing uses of the Harbor. This approach requires the development of engineering plans which would restrict the dispersal of PCBs during dredging. Three types of dredges could be used for dredging of Harbor sediments, mechanical, hydraulic and pneumatic. Each has advantages and drawbacks. Dredging also requires the dewatering of removed material and final disposal of the remaining solids with an appropriate method such as landfilling or incineration.

2.1.2. Encapsulation Containment, or Destruction of PCBs in the Harbor

All concepts described in this section involve methods which would not require removal of PCB contaminated material from the Waukegan area.

Closing the entire Harbor

This concept involves installing a permanent dam across the Harbor entrance to halt movement of PCBs into the Lake and exclude fish from entering the Harbor. Optionally, this alternative could include filling the entire Harbor with earth.

Encapsulation of contaminated materials in portions of the Harbor

In this concept the northern portion of the Harbor, including slip #3, would be sealed off by a permanent, impermeable dam. Contaminated materials would then be dredged from the remainder of the Harbor and placed behind the dam. Overflow water would be treated to remove PCBs. A clay slurry wall would be constructed to surround the area on the western, northern and eastern perimeters and extending down into the natural clay layers to seal off horizontal groundwater flow. Finally, the sediments inside the enclosure would be chemically fixed to solidify or aggregate them and the hole would be covered over with clay and soil. The upper portion of the Harbor would then no longer exist. In its place would be a permanent PCB waste disposal site.

In-place destruction of PCBs found in Harbor sediments

In-place destruction is accomplished by introducing a foreign chemical or biological agent into the contaminated material. The agent is thoroughly

mixed with all the contaminated material. Methods for biological destruction of PCBs have so far had only laboratory or small, experimental pilot plant applications. Some of the problems with biological destruction include maintaining the viability of the organisms, dealing with breakdown products which may affect other biota, and destroying all types of PCBs with equal proficiency. Mason and Hanger (1980) report that investigators in a midwestern laboratory have been working on a mutant strain of bacteria capable of destroying PCBs in-situ. However, these bacteria were reported to require aerobic conditions and the addition of nutrients and other chemicals to sustain the process.

Several chemical methods have been developed for destroying PCBs as pure liquids or as contaminated oils. Processes of chemical destruction would only be applicable if PCBs were extracted from contaminated soil materials. Organic solvents such as hexane can be used to extract PCBs from dredge spoils but cannot be used for this purpose under water.

Use of ultraviolet light energy to destroy PCBs is not applicable to PCBs which are dispersed through sediments.

In-place fixation of PCB contaminated Harbor sediments

In-place fixation techniques have been used at other hazardous waste disposal sites. Potential fixing agents include portland cement, lime, sodium silicate and certain polymers. Regardless of the fixing agent used, the process requires complete contact with contaminated material and therefore would necessitate considerable mixing of Harbor sediments. When mixing is complete, the fixing agent and contaminated material becomes hardened or aggregated. According to Mason and Hanger (1980) a successful sediment fixation project has been carried out in a Japanese harbor. PCB contaminated sediments were stabilized in-place in 1973 and no significant leaching has since been reported. The long term stability of the fixed sediments in this reported case is unknown.

2.2. Screening of Potentially Feasible Methods to Abate the PCB Contamination

The potentially feasible methods described in Section 2.1. were screened to select the most acceptable options. One conceptual approach was selected. The screening process is based on qualitative considerations of engineering feasibility, social acceptability and environmental impact. Precise cost estimates were not used as a basis for screening of the various options (USEPA 1981). In general, unproven methodologies or techniques which were judged to be cumbersome and risk filled were not considered to be appropriate for the handling of hazardous PCB contaminated materials.

Excavation of Harbor sediments

There are several serious engineering problems to overcome before this method could be utilized in Waukegan Harbor. If water were drained from the Harbor, sheet piling and the adjacent shoreline areas can be expected to cave in. To prevent this, a slurry wall and other shoreline retaining devices would have to be built to surround the entire Harbor. Because of these factors, this would be an expensive and difficult alternative. Some evaporation of PCBs from the Harbor sediments could be expected during excavation. Waukegan Harbor is an important harbor of refuge on Lake Michigan and has considerable recreational and commercial importance. Lengthy closure for excavation is likely to result in economic loss for industry and may also meet with strong resistance in the community.

Because of the engineering and environmental problems, excavation of all Harbor sediments is not considered a good option for the Harbor component of the project. Limited excavation may be appropriate, though, where deep contamination is found, such as in Slip #3, and where excavation inside a coffer dam may be the only practical alternative for removal of contaminated materials in a confined area.

Dredging of Harbor sediments

Harbor dredging techniques are commonly used in Lake Michigan harbors; equipment and experienced contractors are available. Methods to minimize sediment resuspension and transport have been tested and applied in similar

situations. Volatility will be minimal as long as the sediments remain water-saturated. Conflicts with existing harbor uses can be minimized by the careful scheduling of dredging activities. Only portions of the Harbor would undergo dredging at any one time, and the remainder left open to the public. The clean up would be complete and final, with no uncertainty about long-term effectiveness. In order to complete the dredging and dewatering activities efficiently and safely, a dewatering facility must be built as close as possible to the Harbor. Therefore, vacant land must be obtained for temporary use, preferably with frontage on the Harbor. Any of the available dredging methods are considered to be reasonable options for the Harbor component of the project. The choice of a preferred method will depend on environmental constraints, availability of equipment, and cost.

Closing the entire Harbor

Permanent closure of Waukegan Harbor would deter PCB movement into Lake Michigan. However, some PCB movement within the groundwater would still be possible. Volatility could become a problem as the stagnation that would result could cause anoxic conditions under which more PCBs could dissolve into the water. The only way to avoid the volatility problem would be to fill up the entire Harbor, certainly a monumental task. Closure and or filling of the Harbor would result in the loss of an important recreational resource and displace the shipping commerce important to at least two industries. Additionally, PCBs would not be completely contained. Because of these problems, Harbor closure is unacceptable from an environmental and social standpoint.

Encapsulation of PCB contaminated materials in portions of the Harbor

The apparent simplicity of this concept and the reduced need for ultimate disposal capacity offsite make this option seem attractive. There are, however, technical, environmental and social problems associated with encapsulation of contaminated materials. The cost of making the encapsulated PCBs secure is not known. Construction and operation of what amounts to a hazardous waste disposal site in Waukegan Harbor may run into difficulties with the State of Illinois and Federal permitting requirements due to environmental concerns and because areas of navigable water would be lost. In addition,

implementation of this option would set a legal precedent that could potentially be applied in other situations where in-place disposal may be even less secure.

Monitoring of PCB movement and leachate collection would be difficult and costly owing to high groundwater elevations at the site. There is an absence of previous technical experience establishing the security of PCBs disposed of in this manner. At a minimum, this concept would involve loss of some of the business property of Larsen Marine Co., a loss of some docking and marina services now offered to the public, and the loss of a substantial area of navigable water. Under the present Superfund Program implemented by the USEPA, the State of Illinois would be responsible for management of the site. If the encapsulized waste subsequently became insecure due to design failure, there would be no mechanism or funds for abatement. Another disadvantage of encapsulation is that it would retain a large volume of PCBs in a heavily used area where disruptive changes in land use are likely to occur.

Because of these problems and uncertainities, encapsulation of PCB contaminated materials in a portion of Waukegan Harbor is not considered to be a good option for the Harbor component of the project.

In-place destruction of PCBs found in Harbor sediments

The complete mixing necessary to promote the reaction of a destroying agent with all PCBs could not take place without considerable roiling of the sediments. Such a roiling could cause an increase in the rate of PCB movement into Lake Michigan. The effectiveness of recently developed chemical or biological agents has not been tested on full scale projects and the environmental impacts of the agents are unknown. In general, there is a risk that destruction techniques will not be well adapted to environments where the water chemistry and temperature are non-uniform and uncontrollable. Therefore, in-place destruction options are not worthy of detailed consideration for the Harbor component of the project.

In-place fixation of PCB contaminated Harbor sediments

Complete mixing of a fixing agent with the sediments may be difficult to achieve. The process would have to be continuous because once the agent has hardened in the bottom sediments it would be difficult to renew the process and keep continuity in the aggregate. If it were possible to achieve complete, continuous fixation with an environmentally safe agent, future maintenance dredging for navigation would be difficult if the integrity of the bottom aggregate is also to be maintained. In addition, because the fixation technologies are new, long term stability has not been proven. If the aggregate were to lose integrity over the long term, the project would have been a waste of money and the environment not protected. Therefore, as a general conceptual option, in-place fixation cannot be recommended. This option may have important limited applications, though, where dredging is not appropriate (in deeply undercut banks or beneath retaining walls). As such, it may be a useful supplement to dredging and should not be precluded from further consideration.

2.3. Comparison and Selection of a Recommended Alternative

Based on the first level of review and screening (Sections 2.1. and 2.2.) it is recommended that the project be developed, planned, and engineered using the conceptual alternative listed here. It is recommended that PCB contaminated materials be removed from Waukegan Harbor by an appropriate dredging technique. This technology requires the use of a temporary, on-site dewatering facility for dredge spoils, and the development of a final disposal method.

A Harbor dredging program has been detailed by Mason & Hanger Engineers (1981). Dredging options include carrying out the project in three phases; dredging and excavation of Slip #3 (Plan 1), dredging of the Harbor area containing greater than 50 ppm PCB (Plan 2), and dredging of the Harbor areas containing greater than 10 ppm (Plan 3) (Figure 1). Engineering plans have been completed for all three dredging areas delineated on the project map. The total extent of dredging to be carried out will be determined based upon the screening process used in the preparation of the EIS.

Water quality and bioaccumulation models of PCB movement in the Waukegan area indicate that the incremental public health benefits that would be achieved by implementation of Plan 3 are considerably less than those that would be achieved through implementation of Plan 1 and Plan 2. (USEPA 1981). There is a large volume of sediments in the Plan 3 area with relatively low PCB content. A large amount of the project schedule and money would be required to clean up the small amount of widely dispersed PCB contamination that exists in the central Harbor area.

It is recommended that dredging of contaminated Harbor sediments be conducted over two phases whereby the most contaminated materials are dredged first. That is, Plan 1 should be implemented first, followed by Plan 2. Under this two-phase, stepped approach, maximum benefit to public health will be achieved. Any contaminated materials transferred out of the Plan 1 area during dredging will be removed during the Plan 2 implementation.

The construction of a sediment dewatering facility is a necessary element of the project, regardless of the extent of dredging. This facility must be constructed and completed prior to the initiating of the dredging program and must contain a water treatment facility. Unanticipated complications with construction of the necessary sediment dewatering facilities must not be allowed to consume project time in the summer of 1982. Therefore, it is recommended that the lagoon construction be completed in the spring of 1982. This means that site clearing and preparation must begin at the earliest possible time. The construction of the dredge spoils dewatering facility (lagoon) is a critical first step in the Waukegan Harbor PCB clean up schedule. The following sections will discuss the recommended design of the lagoon and treatment facilities and the potential environmental impacts associated with their construction.

Need For Lagoon

It is recommended that the dredging use a hydraulic or a pneumatic dredg because of the small particle sizes associated with the muck and its semiflu properties, and because these dredges are associated with less roiling of bottom sediment. (A "clamshell" dredge is not recommended for use due to it

inability to remove sediment in confined spaces or from under shore-retaining walls and because of the clamshell dredge's tendency to spill large amounts of solid materials during transfer to a transport barge.) The actual dredging techniques to be employed in Waukegan Harbor will be further refined and addressed in the EIS. Included in these refinements will be the use of "silt curtains" to minimize sediment dispersal in the Harbor.

The dredged material, in situ, is expected to contain roughly 50 percent water. The dredge removes water along with the solid material and additional water may have to be pumped out of the harbor bottom to insure removal of residual contaminated sediments. Prior to final disposal, excess water must be separated from the dredged sediment. To accomplish this, it is recommended that a dewatering lagoon and a treatment plant be constructed. There are two vacant parcels of land near Waukegan Harbor which could accomodate a lagoon and treatment facility. The site which appears to offer the safest and most cost-effective opportunity for lagoon construction and operation is the vacant OMC property adjacent to the east side of the Harbor (USEPA 1981). The alternate site for the lagoon would be the vacant land west of the railroad tracks and northwest of the Harbor (Figure 4). If the alternate site were to be utilized for the lagoon there would be serious engineering feasibility and environmental problems to overcome. The lagoon would be located approximately 1/2 mile from the nearest point of Harbor access. A pipeline transport system would be needed to move dredged materials across a public roadway, across a railroad track and through private property. The increased cost and potential environmental problems associated with transport of dredged materials to the alternate site make it the least preferred option (USEPA 1981). Because of the convenience and safety and cost advantages of building the lagoon as close as possible to the Harbor, it is recommended that the lagoon and treatment plant be constructed on the vacant OMC property.

Lagoon Description

During the dredging operation, the bottom sediment will be slurried with water and transferred to the temporary lagoon. The sediment will be allowed to settle, and the excess water withdrawn, treated to remove PCBs, and then returned to the harbor. The treated water will contain PCB concentrations that will always be less than 1 ppb (USEPA 1981).

Initial engineering plans considered the construction of 2 lagoons, a north and a south lagoon. The north lagoon would have included a separate small section for the highly contaminated sediment excavated from Slip #3. The two lagoons would have had sufficient capacity (150,000 cubic yards each) to contain all the contaminated sediment above 10 ppm PCB, excavated sand and clay from slip #3, slurry water, and water used to clean out the residual sediments and to flush out the slurry lines. The pair of lagoons were intended to be used for a period of 2 to 5 years for sediment dewatering.

Based on a more recent cost analysis, it is recommended that the plans specify the construction of a single, smaller lagoon with a total capacity which will depend on the extent of dredging which is to be completed. The most up to date plans call for dredging of all sediment containing more than 5 ppm of PCBs. This would necessitate a lagoon with a total capacity of 100,000 cubic yards. It is expected that the dredged sediments will be allowed to settle for approximately one year, after which time the water content should reach an estimated 50 percent by weight. At that time the sediments will be removed for final disposal utilizing special wet solids (sludge) handling equipment. The construction of the lagoon will be similar to that of a secure landfill, and will utilize impermeable clay liners and leachate collection systems. The design is shown in Figure 2, section A-A (a cross-section through the bottom of the lagoon). There will be a one-foot clay liner above the existing ground and a leachate collection system above the liner. The leachate collection system will have perforated pipes located in a one-foot-thick gravel layer. Above the leachate collector will be three feet of impermeable clay which will be compacted during construction to achieve a permeability coefficient of at least 10^{-7} cm/sec. The primary purpose of the bottom-most system is to provide safe leachate collection in case the upper-most clay liner fails. In addition, it can be used to test the integrity of the clay liner.

A six-inch thick layer of sand will be placed above the upper-most clay liner. Its purpose will be to facilitate the final dewatering of the sediments in the lagoon. The slightly contaminated (generally less than 5 ppm PCB) sand piles on OMC vacant land might be used for this purpose. The dredged sediments would, after the passage of time, achieve approximately the same

moisture content in the lagoon as they possess in the Harbor. Drainage systems in the sand layer will be used to further reduce water content when settling is complete and overlying water has been pumped away.

The sides of the lagoon will be diked with a ramp for access. The design is shown in Figure 2, Section B-B. The three-foot clay liner will extend up the slope of the lagoon from its bottom and will be in contact with the contaminated sediments. The diked sides will have 3:1 slope for stability, and the dike will be constructed of soil material brought in from off site and perhaps some material from the existing sand piles. The leachate collection system will extend through the dike walls, as shown, to facilitate the collection of samples and the removal of any leachate collected.

Procedures also will be employed to minimize volatilization during the initial placement and temporary storage of the sediments in the lagoon. It is anticipated that the dredge spoil discharge pipe will be placed on floats which can then be controlled to discharge the sediments evenly around the lagoon. It is recommended that at the discharge point, the pipe be vertical and that it be located below the surface of the water to minimize turbulance and subsequent volitalization of PCBs.

Water Treatment Description

Excess water will build up in the lagoon because water will be used to slurry harbor sediments into the lagoon, to vacuum up remaining contaminated Harbor sediments and to flush out slurry lines. This supernatant water will be treated for PCB removal before being returned to the Harbor. Treatment will consist of:

- Settling of the sediments in the lagoon
- Pumping excess water and sending it into a smaller sedimentation basin where a polymer will be added to coagulate and settle fine sediment
- Pumping the sedimentation basin water through pressure filters
- Conveying filter effluent through carbon filters to a clear well.

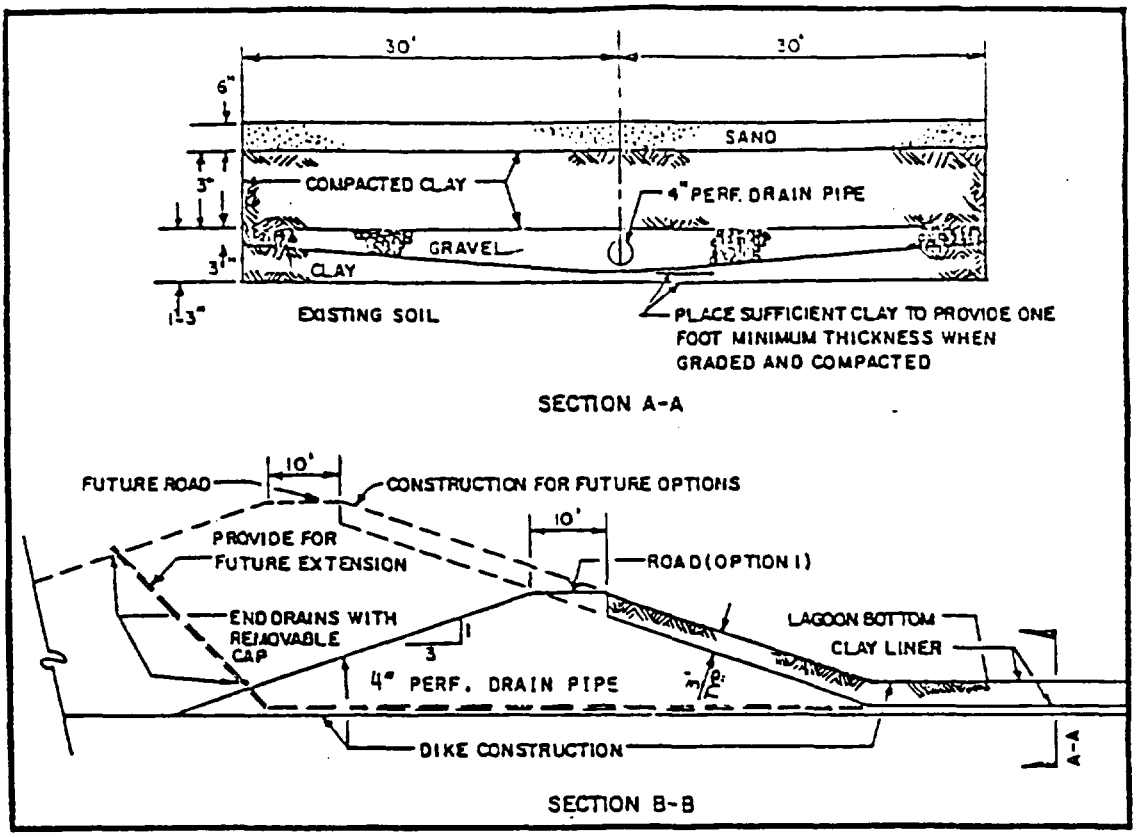

Figure 2. Cross sections of lagoon. Derived from Mason and Hanger Engineers, report to USEPA (1980).

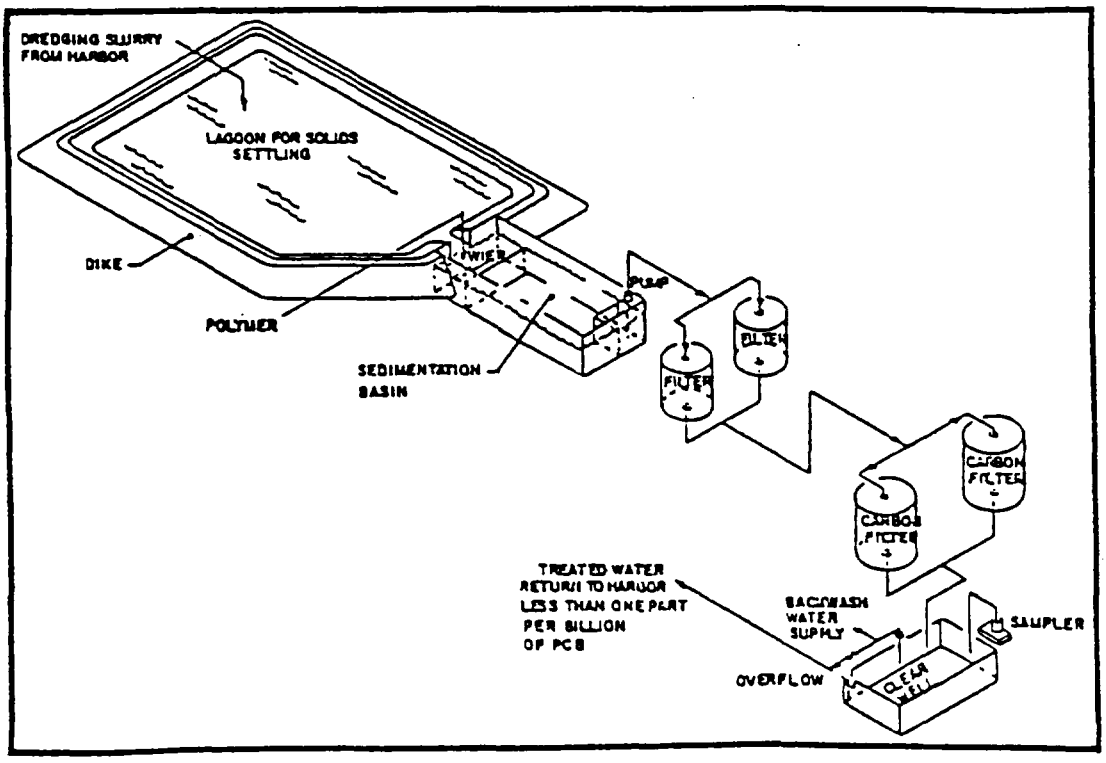

Figure 3. Treatment system for removal of PCBs from excess water. Derived from Mason and Hanger Engineers, report to USEPA (1980).

The water in the clear well will be monitored for PCB content before it is returned to the Harbor. A 1 ppb limitation of PCB concentration for water returned to the Harbor will be maintained. Figure 3 illustrates the proposed treatment system. Rainwater and leachate water will be treated in essentially the same manner, except that the operation will be intermittent and the volume smaller.

Leachate Monitoring

Groundwater monitoring wells are proposed to be installed to satisfy Annex II requirements of regulation 40 CFR part 761.41. Six well sampling points are proposed to be monitored. The monitoring well discharges will be collected and combined with sediment leachate and rainwater and treated. The regulation specifies that analysis is required for PCBs, pH, specific conductance, and chlorinated organics.

In addition, the lagoon will have a leachate collection system that should be monitored on a predetermined, periodic basis and analyzed for PCBs. The leachate collection system consists of perforated pipe in a bed of gravel-sand, which in turn is sandwiched between layers of clay liners. The contents of the perforated pipe is pumped out as required and transferred to a point (e.g. the sedimentation basin) where a uniform sample can be collected for analysis. Any collected leachate water is then treated to remove PCBs.

The dredged sediments will rest on a 6 inch bed of sand which will contain perforated pipe. This leachate from this sand bed also will be periodically pumped out and disposed of as above.

3.0. ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

3.1. Environmental Consequences of Construction of Dewatering Lagoon,

This section addresses the environmental impacts associated with the construction of a sediment dewatering facility (lagoon with treatment plant). Impacts of concern include noise, dust, and surface water contamination. The dewatering lagoon is proposed to be located on OMC property east of the Harbor (Figure 4). The site is currently vacant. The site is bordered by the Harbor and Larsen Marine on the west, Sea Horse Drive and OMC Corporate Headquarters on the north, the Waukegan public beach and the OMC data processing center on the east, and the Johnson Outboards Plant No. 1 on the south. The vacant lot that would be used for the dewatering lagoon encompasses approximately 28 acres. The dewatering lagoon will require approximately half of the site. A berm made up of dredge spoils approximately 20 feet high is located on the western margin of the site and separates the parcel from the Harbor. The only use of the site at present is the summer storage of boat cradles used by Larsen Marine for winter boat storage. The empty wooden cradles are stacked on the northwest portion of the site. The cradles are moved into the fenced area around Larsen Marine during the winter and used to hold boats for winter storage. No boats are stored outside the fenced area around Larsen Marine during the winter (by telephone, Mr. Ken Larsen, Larsen Marine Service, Incorporated, to WAPORA, Inc. 10 August 1980). With the exception of the berm on the Harbor side of the property, the parcel is level. There are no trees or unique natural features on the site.

There is a sewer line traversing the site and the foundation of the coke plant that previously stood on the site is still present. The proposed site is otherwise vacant and the surrounding area is primarily in industrial use. Therefore, a dewatering lagoon is not regarded as incompatible with adjacent areas (Figure 4).

During lagoon construction, several noise and dust emitting activities will be ongoing. Because lagoon excavation requires the transportation of excavated and fill material, it is expected that ongoing activities will utilize trucks, dozers, backhoes, rollers, and other earth moving and stabilizing equipment. Construction time and truck traffic have been estimated

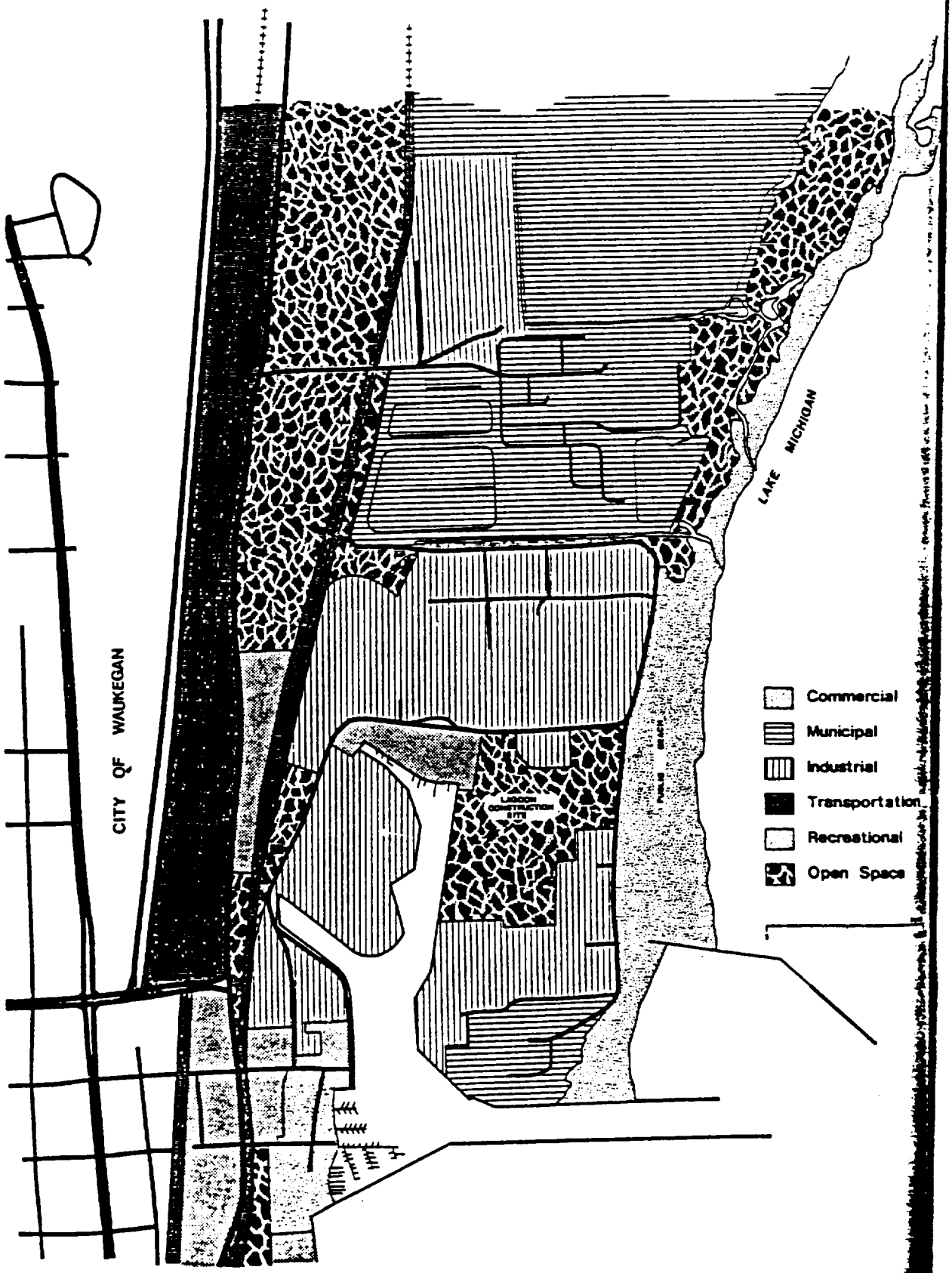

Figure 4. Land use in the vicinity of Waukegan Harbor, Waukegan, Illino

based on several criteria obtained from Mason and Hanger Engineers (personal communication from Mr. Marion Lail to WAPORA, Inc. May 1981) as follows:

- A total of 200,000 cubic yards (cu. yd.) of material must be moved
- 1200 cu. yd. of material can be moved per 8 hrs
- A work day will consist of 16 hrs
- A work week will consist of 7 days
- Trucks have a capacity of 12 cu. yd.

Based on these criteria, it is estimated that lagoon construction will take at least 12 weeks. This is based on 13 truck trips per hour for 16 hours per day for 7 days per week. These estimates assume optimum conditions and no delays. However, based on past experience, it is likely that delays will be encountered and it may be assumed that the construction time will extend beyond the 12 weeks.

Environmental impacts associated with heavy construction, especially earth moving activities, are noise, dust and erosion. These are addressed separately in the following sections. Only the on-site impacts are discussed; the successful bidder is expected to provide the 200,000 cu. yd. of clay and sand from whatever source may be arranged. The impacts of these earth moving activities are considered incidental to the actual lagoon construction and removal.

Noise

Noise will be emitted during construction by the heavy-duty earth moving equipment. These will be operating 16 hours per day, seven days a week. Given the nature of the construction activity that will be required, it may be expected that the one-hour equivalent sound levels (L eq) will increase by several decibels. However, the only sensitive receptor is the public beach that is approximately 1000 feet from the site. Otherwise, the area is primarily in industrial land use and noise is a typical component of the manmade environment. It is anticipated that there will be no adverse long term noise impacts from the lagoon construction activities.

Mitigating measures will consist of insuring that all equipment is properly maintained (e.g., muffler systems are operating properly) so that emitted noise is within reasonable range. If noise emissions exceed the acceptable level, the hours of operation can be curtailed accordingly.

Dust

Construction of the dewatering lagoon will generate fugitive dust at the construction site and along the haul roads. The area impacted is dependent on local wind direction and velocity. Normally, the wind blows from the lake toward the land during the day. Therefore, the areas west of the site may be most vulnerable to impact from dust, while the other surrounding areas to the north and south may experience occasional dust impacts as the wind shifts to those directions.

Receptors located west of the construction site include the National Gypsum Co. (approximately 500 feet across the harbor between Slips #1 and #3) and Larsen Marine. National Gypsum Co. is not considered a sensitive receptor. Larsen Marine is considered a sensitive receptor. The area near the haul road which may be strongly impacted is the Outboard Marine Corp., especially their parking lot. The public beach on Lake Michigan is east of the site and is not expected to be impacted under prevailing daytime wind conditions. The Harbor, boat launching and breakwater areas south of the site are also sensitive receptors.

The major impact from dust will be a nuisance problem as the dust may coat cars in parking lots and boats at Larsen Marine. Fugitive dust generated by construction activities is a short-term reversible impact and can be minimized with proper controls including the use of street sweeping equipment on paved roads, and wetting the unpaved roads and construction areas. Occasional dust related nuisance conditions may be experienced in the the Harbor and on the breakwater. This also is a short term, reversible impact.

Erosion

Erosion can result when earth moving or excavating in construction projects takes place in areas exhibiting substantial topographic relief. Soil erosion on the site area also is a concern because of the potential for storm water to carry sediment into the Harbor or into Lake Michigan. The proposed site for the dewatering lagoon is generally level and it may be assumed that erosion will not be a problem. It is recommended, however, that proper excavation techniques be used to minimize any potential erosion. Once construction is completed, the area outside the lagoon should be graded so that runoff may be collected and detained prior to movement into the surface water.

Road destruction

The capability of roads leading to the lagoon site to sustain the loads imposed by clay hauling trucks may be of some concern. If road destruction becomes a problem, repairs may be required as well as a reduction in haul volumes in the trucks. In addition, the scheduling of construction activities, and particularly the movement of trucks and equipment into and out of the site, will be done so as to minimize traffic congestion. Whenever possible, truck movements will be scheduled around work shift changes at nearby industries so that conflicts with peak travel periods are reduced.

Water Quality and Aesthetics at the Public Beach

Due to the low profile of the lagoon facilities, their planned set-back from the waterfront and the low relief of the site, there is very little probability that construction will degrade the water quality or the aesthetics of the public beach area near the site.

The proposed lagoon site was formerly the site of a foundry (USEPA 1981) and there is a possiblity that site clearing will reveal demolition rubble that contains scrap metal and foundry sand as well as other unknown materials. The construction crews should be informed of this possibility in advance and be prepared to transport such materials to a suitable disposal facility. An effort can be made to minimize the stockpiling of debris or construction

materials on the vacant land adjacent to the public beach (east of the site). Such measures will lessen aesthetic impacts to the beach area.

Endangered and Threatened Species

Due to the relative scarcity of vegetative cover in the project area and the high level of human activity in and around the proposed lagoon construction site, sensitive birds and mammals would tend to avoid the area except during evening and early morning hours. However, a colony of common terns is known to breed in the Harbor area (By telephone, Mr. James Neal, Chicago Ornithological Society, to WAPORA, Inc., 20 July 1981). Juvenile black terns were observed on the light standards at the North Waukegan Beach, just east of the proposed lagoon site, during a field visit by WAPORA personnel. These young birds were observed giving food calls. Approximately 40 adult terns were present on the breakwater and presumably were taking fish in the area during feeding periods.

It is possible that noise and dust arising from lagoon construction may disturb the terns and prevent them from feeding in or near the Harbor. This is a short term adverse impact and may even be construed as a favorable impact since small fish dwelling within the Harbor are known to be highly contaminated with PCBs (USEPA 1981).

On-Site Impacts

There are no wetlands, prime farmlands, sand dunes, or other environmentally significant features on the project site. The possible exception is in relation to the public beach east of the proposed site. The beach is a major recreational resource for Waukegan and surrounding areas. The City of Waukegan uses the beach for a series of "festivals" held throughout the summer. The 5 festivals scheduled for 1981 are expected to attract between 70,000 and 80,000 people (by telephone, Mr. Paul Seveska, City of Waukegan, Mayors Office, to WAPORA, Inc. 5 August 1981). There are only 250 public parking places available at the beach. For its festivals, the City has an informal arrangement with OMC to use a portion of the proposed site for parking. Approximately 2,500 cars can be accommodated on the portion of the lot

used for parking. Construction of a dewatering lagoon on the vacant lot will directly impact the City's ability to use the beach for large public festivals. In order to protect the equipment and meet safety requirements, public access to the site will be precluded once construction begins. Alternative parking facilities may be available but they will be further from the beach.

4.0. SUMMARY

High levels of PCBs in Waukegan Harbor and adjacent areas represent an immediate and long term threat to Lake Michigan water quality, fish populations, and public health. To rectify this situation, USEPA is simultaneously seeking to require that the discharger, the Outboard Marine Corporation, and the manufacturer, Monsanto Chemical Company, pay for the clean up of the site, and to develop feasibible solutions to the contamination problem before the issue of responsibility is resolved. Several potentially feasible methods for abatement of PCB contamination in Harbor sediments have been identified. These include:

- Excavation of Harbor sediments
- Encapsulation or in-place destructon of PCBs in the Harbor
- Inplace fixation of contaminated sediments
- Dredging and off-site disposal of contaminated sediments
- Closure of the entire Harbor.

Following a screening of these alternatives, dredging and off-site disposal was recommended as the most acceptable method for abatement of PCB contamination in the Harbor area. This method would be effective, have few environmental impacts, could be accomplished relatively quickly, and does not require new or untested technologies.

Because of the immediate threat associated with PCB contamination, it is important that feasible solutions be implemented as quickly as possible. A dewatering lagoon and treatment plant are essential parts of the dredging plan, regardless of the type or method of dredging used. In order for dredging to take place in 1982, the dewatering and treatment facilities must be on line in the spring of 1982. To accomplish this, USEPA has segmented the dewatering lagoon component of the project from the overall Environmental Impact Statement being prepared on the Waukegan Harbor PCB abatement program. A separate Environmental Assessment has been conducted on the construction of a dewatering lagoon and treatment facility.

The recommended site of the proposed dewatering lagoon and treatment facility is a vacant parcel owned by OMC between the Harbor and the Waukegan public beach. The siting of a dewatering lagoon and treatment facility on this parcel is not regarded as incompatible with adjacent industrial land uses. The primary impacts associated with construction are dust, noise, erosion, and possible road destruction. None of the impacts appear to be of a long-term, irreversible nature. Mitigating measures for each of the impacts are available.

5.0 Literature Cited

US Environmental Protection Agency, Region V, 1981. Mathematical Modeling Estimate of Environmental Exposure Due to PCB-Contaminated Harbor Sediments of Waukegan Harbor and North Ditch, 1981, 108 p.

US Environmental Protection Agency, Region V, 1981. An Engineering Study for the Removal and Disposition of PCB Contamination in the Waukegan Harbor and North Ditch at Waukegan, Illinois, 1981. 153 p.